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ADMINISTRATIVE - INTERNAL USE ONLY

ILLEGIB

MEMORANDUM FOR: Executive Director-Comptroller

SUBJECT : Feasibility of Using Recycled Paper

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subject: STATINT

1. This memorandum is for your information only and reports the results of our study on the feasibility of increasing the use of recycled paper by the Agency.

2. The concept of more extensive use of recycled paper products has been studied in coordination with research specialists who are directly involved in production and recycling technology for the paper products and printing industries as well as the Federal Government. At present, an average of 20 percent of this Agency's, and of the nation's, total paper consumption is coming from fiber reclaimed from waste paper. The National Academy of Sciences has recommended in a report to the Department of Health Education and Welfare that goals should be set to increase such reuse to 35 percent by 1985. Industry, in general, is accepting its responsibility toward achievement of this goal and has made encouraging progress in improving the quality of recycled products. In this connection, the management of pulpwood forests has also advanced to the extent that this nation is now growing more pulpwood than it consumes. Further advancements are also expected through improved forestry practices since fires, insects, and disease are now destroying more trees than are used for pulp production. It is foreseen that pulpwood consumption may equal or outstrip production by 1985, however, if the use of paper products continues to expand. At present, one-half of 1 percent of the nation's pulpwood production is being consumed in meeting the overall paper requirements of the Federal Government *and only one-half of one percent of the paper produced for printing in the United States.*

3. Effective solutions to the following problems with recycled paper are presently required, and are being sought by scientists and engineers to increase its potential use:

a. The successful recycling of waste paper is dependent upon its being kept separate from other refuse. Collection, sorting, and transportation now account for 90 percent of all expenditures for recycling, with the result that the cost of recycled products is prohibitive, except in those regions where a recycling facility is located near a concentrated supply of waste paper.

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- b. Recycling produces more pollution than the processing of wood fibers due to the presence of more acids and unusable fibers in the waste paper supply. This pollution problem can be expected to increase since waste paper can only be recycled twice due to degeneration of the fibers. The presence of unusable fibers and pollutants, therefore, increases in proportion to the amount of previously recycled fibers contained in the waste paper supply.
 - c. The quality of recycled products is not yet assured and developments are needed as to quality controls and improved machinery in the mills that use waste paper.
 - d. It is impossible to produce recycled paper of higher quality than that contained in the waste paper supply. For this reason the products of recycled waste are now limited primarily to lower quality paper products such as paper-board, building papers, tissues, and toweling.
 - e. Commercial paper suppliers and printing houses generally do not recommend the use of recycled paper for printed matter. Their reluctance is primarily due to the lack of quality assurance and higher cost. It has not been found satisfactory for use on printing presses such as those used by the Agency printing facilities. Some commercial firms have found it adequate for low quality multilith work. Recycled paper for printing production can be obtained if the customer insists, but, no guarantee is provided against its inherent faults.
 - f. The 100 percent reclaimed paper now marketed on a trial basis for typing correspondence does not equal the quality of paper now used for this purpose. Neat erasures and corrections cannot be made to its soft textured surface. This problem was confirmed by internal Agency tests of the "Ecology" brand papers distributed by a local paper firm.
4. The shortcomings described above will undoubtedly be solved as research and development work progress. Until solutions are reached, the Government Printing Office (GPO) is understandably reluctant to commit the Federal agencies to an all-out program aimed toward the immediate, 100 percent use of recycled paper. GPO advises that an opinion to this effect will be reflected in a forthcoming report from its Chief of Technical Research Operations, Dr. Hobbs. The Agency obtains 85-90 percent of its paper requirements through GPO, and GPO has no plans at this time to stock paper having a high recycled content.

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specifications calling for increased

5. The Assistant Staff Director of the Joint Committee on Printing (JCP) advises that the JCP also does not plan to ~~enforce~~ the Government-wide use of recycled paper due to the number of recycling problems requiring solution before the success of an expanded program can be assured. Further, the JCP finds no merit in the several "universe" bills now proposed in this area by legislative representatives and expects none of them to be passed.

6. The remaining 10-15 percent of the Agency's paper supplies are obtained primarily through the General Services Administration's Federal Supply Service (FSS). Since the type of paper supplies provided by the FSS fall in the utilitarian category, i.e., paperboard, toweling, tissues, etc., these are presently adaptable to production through the recycling process. The Director of the Standards Division, FSS, advises that standard specifications have now been adopted for 14 of the various paper items which can be produced from recycled waste and continued progress is planned. As the standards are adopted, the recycled items will be furnished to all Government agencies.

7. In summary, considerable research and development work remains to be done in perfecting the recycling process and the resulting products. We will continue to keep abreast of all progress in this area and will take action to expand the Agency's use of recycled paper products whenever we are assured that their quality and cost are comparable to wood pulp products.

Robert S. Wattles

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The Paper Industry's Part in Protecting the Environment

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HIGHLIGHTS

This statement broadly describes the part being played by the paper industry in protecting the environment. It reflects the prevailing policies and practices among paper manufacturers* with respect to abatement of water and air pollution, to forest conservation and to the reduction of solid waste through the use of waste paper; it describes the background out of which the industry's views on these issues have developed; and it shows what has so far been accomplished, the lines of action now being followed, and goals in view. Highlights of the statement follow.

Water Quality

Expenditures approaching \$500 million already made for water quality protection, and unprecedented budgets for the years 1970-72 indicate the intensity of the industry's effort to abate water pollution. Among significant results to date are:

- sharp reductions in the solids content of paper mill effluents and a drop of over 50% in biochemical oxygen demand per ton of production;
- increasing reuse of water in pulp and paper production, reducing the need for water per ton of paper produced by well over a third;
- recapture and recycling of nearly half a million tons of wood fiber previously lost in waste water;
- elimination of all but traces of mercury in paper mill effluent;
- progress in developing technology of color removal.

The industry believes that further important environmental gains can be assured with minimum economic strain on the communities affected by:

- relating water standards and criteria to the present and realistically foreseeable uses of streams and lakes in specific localities;
- extending the concept of publicly-owned facilities for treating effluents from communities and industries, with industries paying use charges related to the costs of treating their effluents;
- increasing the financial ability of municipalities to join with industry in building treatment plants capable of handling both community sewage and industrial wastes;
- giving due consideration to the needs of local communities,

*As used in this statement, the phrases "paper manufacturers", "paper companies", "paper mills", "pulp and paper mills", "paper industry" and "the industry" include producers of pulp, paper and paperboard.

- when setting waste-treatment schedules for old mills unable to sustain the financial burden of rapid, large-scale investment in new anti-pollution facilities;
- extending beyond January 1, 1975 the five-year amortization of pollution control facilities permitted under the present law, and broadening the definition of pollution control facilities.

Air Quality

The industry's outlays for air quality have been growing rapidly, with \$167 million already spent and \$90 million more earmarked for additional air-treatment facilities in 1970-72. Considerable progress has been made in controlling atmospheric emissions, and work in this field is progressing. Pulp and paper mills have reduced particulates in their emissions by 90%, with higher efficiencies becoming common at many mills. Other lines of action currently receiving concentrated attention include:

- introduction of new processes and equipment to abate odor in stack emissions;
- further research to advance air-treatment technology and find practical solutions to air-quality problems still confronting the industry, notably process emissions of sulfur dioxide.

As in the instance of water treatment, the industry attaches high importance to the amendment of the present rules governing amortization of air-treatment facilities, extending the 5-year amortization period beyond January 1, 1975, and broadening the definition of such facilities. Without such amendment the economic consequences of government's regulations could be detrimental to many local communities as well as to the industry's environmental programs.

Forest Management

Among the results obtained by the paper industry through advanced forest management practices, three facts deserve special attention:

- more effective utilization of timber, of wood residues at the mill and of waste paper, which now provides some 46% of the wood fiber annually consumed in paper manufacture;
- research by forest product companies to increase the growth rate and enhance the disease-resistant qualities of the trees from which they draw their timber, and to obtain the maximum yield of wood fiber;
- plantings by paper companies since 1960 of over 3 billion trees on their own land, and extensive ground preparation for natural reseeding.

Taken together, these measures are materially increasing the timber

yield per acre of the nation's forests — a development that will aid the industry in meeting future enlarged demand for its products, and that will go far to offset demographic and economic trends tending to reduce the nation's forest acres. At the same time, the ecological values of the industry's reforestation program and management practices play a significant part in flood prevention, in replenishment of water tables, in expanded recreational opportunities, and in increased absorption of carbon dioxide and increased production of oxygen through photosynthesis.

Reuse of Waste Paper

At the present time some 20% of the paper and paperboard consumed in the United States is made from recycled pulp. As a factor in helping to mitigate the waste paper problem, recycling merits and is receiving concentrated attention from paper companies and their associations.

Economically viable recycling depends largely on the quality and price of waste paper received by the mill, and the degree of its separation from other substances. A significant fact in this connection is that the related costs of collection, sorting and transportation may well approach 90% of all expenditures for processing waste paper into pulp.

Markets for recycled paper products are varied and substantial, but to expand them significantly will require increasing consumer acceptance, development of new products, and the solution of many formidable technical and economic problems.

In the opinion of the industry, some of the governmental goals proposed for future reuse of paper require further critical review, especially with respect to their economic implications. The industry further believes that legislation designed to attack the waste paper problem through disposal charges or special taxation would hamper rather than advance the cause of environmental protection. More realistic and effective measures might be forthcoming, the industry believes, from closer collaboration between government and industry specialists.

INTRODUCTION

The nature of its business gives the paper industry strong practical reasons for pursuing policies consistent with the findings of ecologists and conservationists. Its very life depends on the continual renewal of its raw material source, the forests, and on an abundant supply of good quality water, without which paper could not be manufactured. Good air is important to the industry not only because of its bearing on the nation's quality of life but specifically because mill personnel and their families share the desire of the communities in which they live for clean air. Self-interest and social responsibility thus point in the same direction, and the industry's efforts for the environment have paralleled public concern.

As early as 1925 the industry initiated studies of water pollution, and what may be called its ecological arm, the National Council of the Paper Industry for Air and Stream Improvement, was organized in 1943 and is completely financed by paper companies. Coordinated research and application studies undertaken by NCASI, the Institute of Paper Chemistry, the Pulp Manufacturers' Research League and the Northwest Pulp and Paper Association over the past 40 years have helped to make possible many technological advances, and have opened the way for much of the progress recently made in environmental protection.

Government Recognition of the Industry's Efforts

A number of government experts have taken note of the industry's efforts for the environment. As long ago as 1958 the U.S. Department of Agriculture reported that the productivity level of forest lands owned and managed by the paper industry was "more favorable than for any other major management group," including federal lands;¹ and progress in this field has since continued at a vigorous pace. Officials of the U. S. Department of Commerce stated in 1970 that "the pulp and paper industry, as one of the major consumptive users of water,* is accepting the social responsibility involved in polluting discharges into streams. . . (The industry) has taken positive action to comply with prescribed standards."² When David D. Dominick, Commissioner, Federal Water Quality Administration, stated at a Senate Committee Hearing, "We feel that industry, by and large, is investing at a rate which more closely approximates the needed rate than we have experienced in the municipal sector,"³ he was not referring specifically to the paper industry, but the remark reflects in part the tangible ac-

*Of the water used by the paper industry only 4% to 5% is actually consumed. The rest, 95% to 96%, is returned to the streams or lakes adjacent to the mills.

complishments of hundreds of paper mills in coping with water pollution problems. Senator Edmund Muskie of Maine, in his capacity as Chairman of the Senate Sub-Committee on Air and Water Pollution, remarked in response to a statement presented by the American Paper Institute on the subject of solid waste that the industry's testimony was "impressive, in that it suggests a purpose and an organized approach to the problem which is reassuring."⁴

The Environmental Priority

Despite its progress, the industry has no illusions about the task ahead of it in environmental protection. Outlays for this purpose planned by paper companies for the 1970's will appreciably exceed the large sums spent in the 1960's. One large company has announced its intention to spend over \$100 million for new equipment and systems to combat water and air pollution in a four-year program to be completed by the end of 1973, and many other companies have earmarked funds of comparable or greater importance, relative to their size, for this purpose. Among the 200 member companies of the American Paper Institute, which represents over 90% of the industry, investment plans for the years immediately ahead give a high priority to anti-pollution facilities. This effort is gaining momentum in spite of the federal government's withdrawal in 1969 of the investment tax credit, and even though such capital expenditures and the substantial cost of operating anti-pollution facilities generally reduce profits.

The Dollar as Yardstick

Although dollar figures cited in connection with environmental costs are sometimes deprecated as not being meaningful, the fact remains that the dollar, if backed by other data, can be a useful yardstick for measuring the intensity of the drive being made by an industry on the environmental front. The essential point is that the large outlays referred to in this statement are an accurate gauge of the concrete results being obtained. The money goes into the installation and operation of costly anti-pollution equipment specifically engineered for each mill and for each type of problem, and into research aimed at further advances in technology. Similarly, expenditures for reforestation and forest management, while they are aimed in the first instance at protection of the industry's interests, clearly benefit the environment through their part in controlling floods and soil erosion, in protecting and extending watersheds, and in improving air quality through the absorption of carbon dioxide and the production of oxygen.

I.

THE DRIVE FOR PROTECTION OF WATER QUALITY

The effluents of pulp and paper mills constitute approximately 15% of the aggregate effluent of American industry.⁵ In order to minimize the quantity and enhance the quality of its waste discharges into receiving bodies of water, the paper industry is following four main lines of action: separating and removing solids, some of them suitable for reuse; minimizing oxygen-consuming substances; conserving water by its repeated reuse within the mill; and reducing color in discharges.

Outlays by the Industry

The magnitude of the industry's water-treatment effort is suggested by recent reports to the President from the Secretary of the Interior on the cost to the nation of achieving higher water quality. In 1968 a Department of the Interior study estimated that to achieve an 85% reduction in its gross wastes the paper industry would need to add \$75.7 million to its then existing investment in water-treatment facilities. The 1969 edition of this study indicated that in order to reduce the existing deficiency in water-treatment requirements and to meet growth needs an average expenditure of about \$25 million per year, over the five-year period 1969-73, ought to be forthcoming from the industry.⁶ The actual capital expenditures of the paper industry for effluent treatment and disposal facilities, exclusive of operating costs,

have been: in 1968, \$49 million; and in 1969, \$74 million; projected expenditures for 1970 are \$113 million; for 1971, \$146 million; and for 1972, \$177 million.⁷ Clearly the industry's outlays are geared to much larger and more rapid results than were originally envisaged by the federal government in the reports cited. The industry recognizes, however, that even these expenditures may need to be further increased as the pace of the industrial drive against water pollution accelerates.

Reports from paper companies show that at the end of 1969 their cumulative capital expenditures for construction and installation of all existing waste water-treatment facilities stood at approximately \$380 million, supplemented by other capital expenditures totaling \$56 million for special in-process loss control installations. Operating costs of the equipment installed came to \$27 million (exclusive of fixed charges) in 1969, and this year may well reach \$40 million. Research costs, which ran at the rate of \$4 million a year in the late 1960's, will probably total \$5 million in 1970.⁸

Results Obtained

Twenty years ago only about 37% of the nation's paper mills had facilities for the treatment of waste water. Today 80% of the mills which provide 90% of the total national paper and paperboard production have such facilities in operation (or pay for the use of publicly-owned facilities). A considerable percentage of these mills are enlarging and improving facilities already installed. As a result, the amount of organic matter discharged in producing an average ton of pulp and paper has been sharply reduced. Mills are removing from waste water annually nearly one million tons of wood fiber, of which approximately one-half is recycled. Other suspended solids present in mill effluents are being reduced proportionately.

Formerly many mills in the paper industry used mercuric compounds as a slimicide in the manufacturing process. More than a decade ago, however, the U. S. Food and Drug Administration issued regulations effectively eliminating the use of mercury compounds in the manufacture of paper that might come into contact with foods. Since then the industry has progressively reduced its reliance on mercuric compounds in the manufacture of all products. Reports gathered by the American Paper Institute indicate that the use of organic mercurials for in-process slime control has been discontinued. Such traces of mercury as are still found in paper mill effluents come from two sources. One source (accounting for perhaps 50% of the traces, in the opinion of some environmental specialists) is the streams or lakes from which mills obtain their water supply, and in which

mercury is already present, since it is an element of almost inescapable prevalence in our environment. The remaining traces come from caustic soda and chlorine required in paper production, and which are partly supplied by chemical manufacturers using the mercury cell process. The American Paper Institute has been informed that these manufacturers, who represent about one-third of the chlor-alkali industry, are carefully monitoring their operations and refining their techniques so as to reduce mercury traces to the absolute technological minimum.

Another major result of increased water treatment by paper mills has been the reduction of biochemical oxygen demand (BOD) from 140 lbs. per ton of paper produced twenty years ago to 68 lbs. in 1969. While total production of the paper industry has grown by 120% in that period, the total BOD load released into the nation's waterways has increased by only 7%. Within the next two years the industry expects the total BOD load to begin decreasing significantly.⁹

Of comparable importance is the performance of paper companies in lowering their need for water per ton of production by well over a third in the past 20 years. This gain results from process improvements which permit the reuse of a given gallon of water several times before it is discharged. As a result, the total volume of water which paper mills now discharge to the nation's streams is not much, if any, greater than it was when the industry was half its present size, and the water discharged is substantially cleaner.¹⁰

The technology that made these achievements possible continues to advance. Among significant recent developments are more efficient solids removal systems and advanced mechanical facilities for dewatering sludge. And coming closer to practical application is experimental work now being done to reduce color in paper mill effluents — the purpose here being essentially aesthetic. While serious technical and economic obstacles remain to be overcome, the 1970's may see an effective solution of the color removal problem.

Setting Standards and Use Charges

Since the character of the environment varies greatly from place to place, government standards and criteria for water discharges need to take regional and local conditions into account. Sound and equitable enforcement of regulations becomes feasible only when due consideration is given to the many and diverse categories of use to which streams and lakes are put.

Much of the environmental benefit of the standards now established may depend on the method by which industry is charged for the effluent that it discharges into public systems. In the past separate

and private facilities to treat mill wastes have generally proved to be the most practical and economical solution, and the same approach may well be taken in constructing a number of water-treatment installations in the future.

In many older mills, particularly those in or close to urban areas, the lack of available land for treatment plants, and economies of scale suggest the increased use of arrangements between industries and municipalities for joint or regional treatment facilities. The industry has already pioneered such arrangements in many locations and has found this to be a constructive approach to urban water pollution problems. The federal government requires that for such joint ventures to qualify for federal support their operating and debt amortization charges be equitably proportioned among users according to the treatment cost of their wastes. That the concept of the use charge is sound is attested by the experience of over 100 paper mills whose effluents are handled by treatment plants owned by local governments. Negotiations with municipalities for such plants are currently in progress at a number of other mill locations.

In sharp contrast to the positive values of the use charge is a proposal currently being discussed at federal and state levels that would impose a special tax on industrial effluents. This proposal could create more problems than it would solve, and hamper the cause of environmental protection rather than serve it. Instead of placing priority on the provision of facilities to reduce pollution, it would impose a punitive tax, while permitting violations of established standards to continue. Even if the proceeds of the tax were used, as its advocates propose, for pollution abatement, this approach offers no substitute for the well-established funding mechanisms of the use-charge system.

Values in Joint Government-Industry Action

The hopes of much of the industry for its water-protection effort would come far closer to fulfillment if more municipalities were in a financial position to join in early implementation of plans for community waste-treatment facilities to be shared with industry, with investment and operating costs equitably divided among all users. The U.S. Comptroller-General has warned that "the present level of federal funding will not be sufficient to enable a significant increase to be made in the effectiveness of the program in abating, controlling and preventing pollution. On the basis of the present level of federal funding, it will be many years before the construction grant program is completed."¹¹

Where joint projects between municipalities and paper companies have proved feasible, considerable progress is being made. An ex-

ample comes from Fitchburg, Mass. where the Nashua River had long been degraded by sewage and industrial wastes. Three Fitchburg paper manufacturers played a major part in arrangements with the city for joint financing of two waste water-treatment plants, in which the federal government and the state will also participate. Within five years these plants are expected to restore the headwaters of the river to acceptable biological, ecological, recreational and aesthetic standards. Similar results have already been achieved or are well within view in a number of other localities where federal funding has permitted jointly-financed waste-treatment facilities, capable of coping with community sewage as well as with industrial wastes.¹²

The Problem of the Old Mills

As to the future of the old and marginal paper mills, the decision in each case will plainly need to be based on detailed knowledge of technical and economic factors. As a general rule it has been found more costly — often two or three times more costly — to deal with the pollution problems of older plants than to install the necessary equipment in a new plant at the time of construction. Early modernization or replacement will doubtless prove to be economically feasible for some older mills, but many may find difficulty in making the required outlays rapidly without impairing their competitive positions, and losing their economic justification for being. For such mills the time element may be of crucial importance, perhaps determining their ability to remain in operation. The industry hopes that as regulatory authorities set schedules for pollution abatement at old mills they will consider the possible economic impact of their decisions on local communities as well as on the mills. A number of old paper mills fall in the category characterized by Assistant Secretary of the Treasury Murray L. Weidenbaum as "facilities which are already in existence and which were constructed in good faith under a different set of ground rules."¹³

The extent to which taxation relief granted to existing plants for combating pollution may benefit their host communities has not as yet been deeply explored in the United States. The government of Sweden has recognized the economic problems confronting paper mills in this category by offering to subsidize their pollution-control installations to the extent of 25% of the costs involved. Since even with such a subsidy older but otherwise reasonably efficient plants are not in an economic position to achieve full pollution control, the Swedish authorities have established a procedure under which the abatement schedules for such plants may be negotiated, and also an environmental court to which a company may apply for modifications in a schedule that it considers unreasonable.

In the United States, the economic strain on existing mills has been somewhat eased by the five-year amortization period permitted by the Tax Reform Act of 1969 for qualifying pollution-control facilities. Legislation in some states allowing the issuance of industrial revenue bonds has also been constructive. The rationale for the five-year amortization provision, which expires on January 1, 1975, was clearly stated in the report of the Senate Finance Committee on the bill: "In effect, private industry is being asked to make an investment which is in part for the benefit of the general public. . . . In view of the possible undesired effect on pollution control by repealing the investment tax credit, and the increasing magnitude of the air and water pollution problem facing the nation today, the committee agrees with the House that it is appropriate to provide an incentive to private industry for anti-pollution efforts."¹⁴

The industry's analysis strongly suggests that the usefulness of this concept may be distinctly limited by the specified termination date of the amortization period and by an unduly restrictive definition of what constitutes an allowable pollution facility. Because of uncertainties still surrounding water and air standards in many places, and fast-changing technology, mills must take into account the strong possibility that facilities installed today may need to be replaced, modified or supplemented in a few years, at considerable additional cost. The industry believes that if the existing law is to be fully effective in encouraging anti-pollution installations for both water and air, it should be modified to permit rapid amortization of expenditures in this category beyond the termination date now specified. For many marginal mills, the decision whether to close down or continue in operation may depend on the amortization time allowed.

II.

IMPROVING AIR QUALITY

Atmospheric emissions from paper mills normally comprise particulates, odorous gases, visible water vapor and sulfur dioxide. Each of these components requires separate treatment.

Particulates, which once were a source of serious concern in the emissions of an important segment of the industry, have long had concentrated attention. For some 20 years paper companies have been using devices for collecting fly ash and other particulates from mill emissions. At the present time 60% of kraft mills have installed equipment capable of removing 97.5% of particulate emissions from recovery furnances, and in other mills installations for this purpose are at the planning or construction stage. In the past five years there has been steady improvement in the efficiency of equipment developed for particulate removal. Improved electrostatic precipitators and other dust collection equipment assuring removal of over 99% of particulates, and permitting reuse of some of the collected substances, are currently coming into use.

Emphasis on Gas Emissions

With the technology to control particulates well advanced and mill outlays for this purpose on the rise, the industry has been focusing sharply on the prevention of objectionable gas emissions, notably those containing sulfur compounds. An important problem here is that of odor. These odorous stack emissions can be controlled quantitatively almost to the vanishing point, but the human nose is so sensitive that it can detect these gases even at concentrations as low as one part per billion.

In the last decade, effective technology for reduction of odor in paper mill emissions has advanced beyond the development stage. With the recent advent of low odor emission recovery systems and the process known as black liquor oxidation, it has become possible to effect important reductions in odor at mill sites. Odor-reducing systems are increasingly coming into use in kraft pulp mills where odor has been a significant problem, and engineering studies for such facilities are being undertaken on a wide scale. In many mills extensive operational alterations must be made before this type of facility can function effectively.

The steam component of atmospheric emissions from paper mills

is not normally considered a pollutant. Its only effect is on visibility, usually confined to the immediate environs of the plant. Nevertheless, feasible methods of controlling the sources of some of these emissions have been developed, mainly by condensing the steam and reusing the water. Ironically, much of the water vapor carried out of mill stacks is created by scrubbing devices designed to reduce particulate matter.

The sulfur dioxide in stack gases is receiving close study from industry scientists and engineers. Many pulp and paper mills operate their own power generating plants and the fuel required by these plants is the main source of SO₂ emissions. This condition is of course common to all industry that burns coal and oil. The problem will probably not be overcome until economically usable fuels with low sulfur content become available or until control technology, still in the development stage, becomes commercially practicable.

Sulfur dioxide emissions resulting from the manufacture of pulp are generally much lower than those from power generation. Data so far compiled from ambient air-quality monitoring systems indicate that SO₂ emissions from pulp manufacturing do not on the whole exceed levels established by government air-quality standards; but the industry is carrying out extensive research to determine the processes best capable of controlling and minimizing such emissions.

Company decisions on treatment of atmospheric emissions, whatever their nature, are necessarily affected by regional considerations. The corrective action needed will differ widely from mill to mill, as a result of differing population density, topography, meteorology, the presence of other industry nearby and the processes used within the mill. The same amount of atmospheric emission may call for more rapid correction at one manufacturing site than at another. A paper company operating in a number of different locations may find it necessary to assign priorities in air-treatment facilities among its various mills, as well as to decide on the most appropriate technology for each mill.

The Industry's Outlay Grows

In spite of the need for exhaustive engineering and environmental studies before air-quality equipment can be installed with assurance in any mill, at the end of the 1960's the industry's capital expenditures to reduce atmospheric emissions were substantial. They totaled about \$138 million for new equipment and \$29 million for adaptations and replacement of existing equipment.¹⁵ For the years 1970-72, the expenditure for additional air-treatment facilities to be made by the industry is estimated at over \$90 million. The forecast for operating costs of installed facilities, based on past experience, averages \$15

million annually, and for research and development \$2.5 million. These expenditures, like those for water quality control, represent a rapidly increasing proportion of the industry's capital budgets.¹⁶

The equipment used in controlling air pollution is frequently an integral part of a mill's process equipment. As a result, to install air-treatment facilities in an existing mill may require far-reaching engineering modifications. The financial base of a mill facing the costs of such internal changes could be seriously weakened unless the new equipment can be rapidly amortized, or the mill is given other tax relief. The solution to this problem may well be the broadening by government of definitions of pollution treatment facilities qualifying for rapid amortization. As in the instance of water treatment, the continued operation of old mills may be threatened by regulations requiring them to install air-treatment facilities, unless government tax policy takes cognizance of their situation, and unless the schedules set up by regulatory agencies for pollution abatement are realistic.

Incineration and Air Quality

A secondary problem of air pollution — one which the industry cannot control, but with which it is concerned — lies in the effect on air quality of incineration of waste paper. Not every municipality has had to come to grips with this problem, since the majority rely on landfill for disposal of solid waste, including paper. The value of waste paper as an important source of wood fiber is stressed in a later section of this statement, but from the point of view of municipalities, paper's biodegradability, enabling it to disintegrate when exposed to the atmosphere or to dampness for a relatively short period of time, makes it a benign component of landfill where sanitary-type sites are available. Where landfill is not practicable, however, incineration has long been the course followed by cities in disposing of collected waste paper mixed with other refuse.

For some time it has been feared that increasing incineration of waste paper, to say nothing of other solid wastes, would add materially to air pollution in metropolitan areas. This anxiety is now diminishing. New types of incinerators recently developed appear capable of eliminating disturbing emissions into the atmosphere. As such equipment is progressively installed, municipalities will be increasingly able to dispose of collected waste without adding materially to air pollution. It has been found, in fact, that where the right kind of equipment is in use, waste paper which cannot be economically separated and recycled can be the fuel which incinerates other types of solid waste, such as garbage; and in some cases incineration with waste paper can be used to generate steam and electricity.

III.

MANAGING THE FORESTS FOR THE FUTURE

The commercial forest lands of the United States now total some 500 million acres, and in spite of an almost continuous rise in the demand for wood products, the nation as a whole is growing more wood than it consumes. Growth alone, however, is not an adequate measure of the environmental values of a forest. Long experience shows that woodlands deteriorate unless they are so managed as to encourage the systematic replacement of older growth by young, strong and healthy trees.

The National Forests, which include 97 million acres of commercial forest land, are located largely in the West. It is estimated that 13 million acres of government-owned woodlands currently require thinning and other sound management measures; and that an additional 4.8 million acres of non-stocked or understocked lands are in urgent need of planting.¹⁷ The problem differs somewhat in the East, including the heavily forested Southeast, where a large proportion of forests are privately owned. Paper companies have found that only by owning or leasing forests which they can manage according to the principles of scientific forestry are they able to assure a perpetual growth of timber with an increasing yield per acre.

Although the industry now owns about 50 million acres of commercial forest, largely located in the East, and leases several million acres of other privately-owned lands, two-thirds of the industry's wood requirements are currently being met from lands of farmers, other private owners, and state and federal agencies. Paper companies representing a substantial segment of the industry look forward to eventual ownership or leasing of sufficient forest land to provide them with at least half of their annual pulpwood requirements in perpetuity.

The United States has always grown its own pulpwood, which is the source of over 98% of the fibrous content of the paper it produces; and since there is no prospect of large-scale, economically justifiable timber imports, the nation must plainly preserve its self-reliant status.

It is therefore essential to recognize that, as matters stand, the industry's annual timber harvest, although it is expanding, will not forever be adequate to meet the demands of growing paper consumption. The increase expected in the nation's population and in its standard of living points to greatly enlarged consumption of paper and paperboard. It has been estimated that by 1985 the industry will need 120 million cords of pulpwood, or about double the amount used in 1969.¹⁶ The problem is deepened by the probability that as federal and state agencies and developing municipalities seek more land for highways, airports, housing developments, wilderness areas and other public uses, inroads will be made on forests, including those owned and leased by paper companies.

Facing a rising demand for paper products on the one hand, and on the other the need to protect the ecological and raw material values of its commercial forest holdings, the industry has been moving vigorously along four lines on its owned and leased lands: reforestation; forest management to produce higher rates of timber growth; genetic improvement of trees; and greater utilization of wood fiber resources. All other forest lands are benefiting indirectly from the greater knowledge and improved techniques developed and demonstrated by these programs.

Reforestation and Forest Management

At a conservative estimate, paper companies since 1960 have planted over 3 billion new trees on their own lands in addition to the natural reseedling that has taken place on prepared ground.¹⁷ Perhaps equally important has been the development of such forestry practices as fertilization and thinning to encourage the rapid development of young trees. At the same time protective measures taken against tree diseases, destructive insects and fire have proved of major value in minimizing tree losses.

Another technique of growing significance is the cultivation of "even-age stands" of trees, maximizing yields, assuring greater efficiency in harvesting, and avoiding wasteful injuries to young trees, such as often occur when mixed stands are harvested. Taken in conjunction, these practices can produce remarkable results. It has been demonstrated that under optimum conditions on good land an acre of well-managed forest in the South can yield as much as 2½ cords of pulpwood per year, as against a typical annual yield per acre of 1/3 cord where advanced management techniques have not been applied.¹⁸ So sharp an increase in the rate of yield is not to be expected outside of the South, though a gradual improvement in yield per acre nationwide is unmistakably developing.

At the same time that new forestry practices are increasing per-acre productivity, they also enhance the forests in three other important respects: as air purifiers through the absorption of large amounts of carbon dioxide and the production of large amounts of oxygen; as sources of useful water, preventing floods, rapid run-off and erosion, and replenishing water tables to the benefit of streams; and as recreational lands. By 1970 over 90% of industry-owned forests — 45 million acres — were open to the public for a wide variety of recreational uses. Wildlife, too, it has been found, benefits from a managed forest, where abundant new growth provides food for deer and other herbivores. This is in contrast to many old forests where new growth is scarce and out of reach of most animals.

The heart of the paper industry's effort in reforestation and forest management is a highly trained body of over 6000 foresters employed by paper companies. These men not only have responsibility for maintaining the industry's forests in prime condition; they also are extending the use of advanced forestry techniques to woodlands belonging to other private owners who are looking for guidance.

The industry's outlay for forest conservation in the past 20 years has totaled about \$1 billion, and since 1960 has run at the average rate of over \$70 million annually.²¹

Genetic Improvement of Trees

Further increases in the future supply of wood fiber are being achieved by the breeding of superior trees, which are highly resistant to disease and to insect attack, and which supply larger quantities of usable fiber per tree in a shorter period of time than does ordinary forest growth. In recent years the government and industry have established 5700 acres of seed orchards to produce seed for growing genetically-improved trees. Nearly 2000 acres of these seed orchards are owned by the pulp and paper industry, and some are already producing seed.²² There is particularly strong leadership in this field in the Southeast where a cooperative program of 23 companies and three state forest services is being carried on under the direction of North Carolina State University.

The Institute of Paper Chemistry at Appleton, Wisconsin has developed and is currently growing in rapidly increasing quantities an improved aspen hybrid which is expected in time to make an appreciable contribution to the nation's supply of commercial timber. This effort may be accelerated by research discoveries recently made at the Institute, where geneticists have succeeded in growing trees from unspecialized tree cells by the use of specific nutrients.

Better Utilization of Timber Resources

Of immediate importance in increasing the industry's wood fiber supply is its increasing ability to utilize timber resources more effectively. Small diameter trees, and species of trees once regarded as useless, are being harvested in the forests and processed for pulp. Research now underway indicates that eventually even stumps may be economically usable. At many mills, sawdust and other wood residues formerly discarded and burned as waste are being converted into pulp on an increasing scale. Nearly 25% of the nation's total fiber consumption for paper is now coming from these sources, with fiber reclaimed from waste paper adding an additional 20%, and fiber recaptured from waste water about 1%. Thus some 46% of the annual consumption of wood fiber in paper manufacture is being supplied in 1970 from raw materials long thought to be largely unusable, and from secondary materials.²³ Section IV of this statement discusses the reuse of waste paper as a further factor in conserving wood fiber.

Additional gains in timber utilization may come from many years of industry research on the possible economic values of lignin, hemicellulose and other substances, which constitute about half the dry weight of most timber used in making pulp. The chief present use of lignin is as fuel in generating steam and electricity. Within limits it can take the place of more costly fossil fuels; and since the supply of lignin is continually renewable through the growing of trees, unlike most other fuels it can be burned without depleting the nation's energy reserves. A few other minor but useful commercial applications of lignin have also been found; and research in this field has led to higher-yield pulping processes suitable for some paper products. It is believed that continued research along this line may in time contribute significantly to conservation and other aspects of environmental improvement.

IV.

THE DEVELOPING REUSE OF WASTE PAPER

Another important source of wood fiber, waste paper, is being given considerably increased attention by the paper industry, the federal government, and a number of states and cities. Accurate appraisal of the environmental and economic potentials in recovering and re-using wood fibers from waste paper must be based on a wide range of data which have not always been sufficiently considered in forming opinion on this subject — notably the volume and components of paper waste, collection and sorting procedures, the nature of recycled paper products and their markets, and a variety of technical factors. The essential facts in this connection are presented below, as a basis for gauging probable future trends in recycling.

Volume and Components of Paper Waste

Of the 58.5 million tons of paper and paperboard consumed in the U.S. in 1969, over 7 million tons remained in permanent use in such forms as books and building materials or were disposed of in home fireplaces or, in the case of such products as tissues, in sewer systems. Some 11.4 million tons, or 20 per cent of the total, were reclaimed and reused. Most of the remaining 40 million tons entered the solid waste stream. On the basis of what is known of the disposition of solid wastes as a whole, it is estimated that in 1969 about two million tons of waste paper may have been used for landfill, 6 million tons incinerated, and some 30 million tons deposited in municipal and town dumps, where the biodegradability of paper causes its gradual disintegration. A current trend to divert more solid waste from dumping to landfill and recycling may well alter these proportions in the years ahead.

Of the tonnage reclaimed, the largest components are used corrugated containers, corrugated clippings and mixed papers from office buildings, closely followed by newspapers and high-grade papers from printing and converting plants. Of all the corrugated boxes produced in 1969, about 25 per cent were collected and reprocessed. Of all the newspapers printed, some 23 per cent were recycled.

Collection and Sorting Procedures

Collection, sorting and transportation account for more than 90 % of all expenditures for processing solid waste, including paper.²⁴ Methods of collection vary widely, and it is important to bear in mind that the successful recycling of waste paper is dependent upon its being kept separate from other refuse, starting at the source of supply — the

home, the office, the factory, and the retail store. Future reduction of the percentage of waste paper deposited in dumps depends largely on the availability of sites suitable for landfill, on related collection facilities, and on public cooperation in making "clean" waste paper available for recycling. When such separated waste paper is recycled, printing ink, adhesives, coatings, plastics and other foreign matter can for the most part be removed and the fibers formed into new paper.

Waste corrugated is usually collected by scrap dealers from super-markets, department stores, retail shops and factories and, after sorting and baling, is delivered to mills. Mixed waste paper also comes largely from dealers, while high-grade waste paper is frequently shipped by converters and printers directly to the mill.

Used newspapers are collected for the most part by the Boy Scouts, by schools, by various citizens' and religious organizations, and in a few instances by municipal sanitation departments. Pilot programs in Madison, Wisconsin and San Francisco have shown that collections of old newspapers can be sharply increased when householders and municipal sanitation workers cooperate to keep newspapers separate from other refuse.

Recycled Paper Products and Their Markets

Many paper companies with suitably located and equipped mills and with markets receptive to products utilizing waste paper have made important strides in recycling and foresee continuing expansion of their operations. By far the most important product of recycled waste paper is combination paperboard, usually made of a variety of recycled fibers, sometimes with a small proportion of virgin pulp. Combination paperboard is used in large quantities to make folding cartons, rigid boxes, fiber cans, posters and book covers.

A market for recycled newsprint has also been established and is expanding. Other successful products made in whole or in part from recycled fibers include building papers and boards such as gypsum liner, molded pulp items, drainage pipe, fine papers, and tissues and toweling. In determining the quality of recycled paper and its end products, the quality of the waste paper available to the pulp mill is a prime factor. It is impossible to produce recycled paper of higher quality than the waste paper used except by the addition of new wood fibers.

Taken as a whole, the national market for products made out of waste paper has been slow to expand. This fact, together with economic and technical problems in collection and transportation, has limited the industry's use of waste paper. An appreciable expansion of such use will require the development of new products acceptable

to the market. Research aimed at the expansion of markets for recycled products is being carried on by the industry-supported Box-board Research and Development Association, as well as by a number of paper companies.

Technical Factors

While the separation of waste paper from foreign substances at the pulp mill has become increasingly feasible, it is a significant element in the cost of recycling, and necessitates disposal of the undesirable materials. Pollution problems may also arise from the presence of unusable fibers in the waste paper supply — a not uncommon situation, since wood fibers lose some of their strength each time they are recycled. The industry has been devoting close attention to these difficulties and has made encouraging progress in working out solutions.

Current research aims also at increasing the efficiency with which secondary fibers are formed into paper, and at improving further the quality of the end products. Recent encouraging developments include a new type of forming machine, a number of which will have been installed by the end of 1970 in mills using waste paper.

Because transportation and labor are a major part of the cost of collecting waste paper, the practicability of recycling varies regionally. Specifically, investment in new plants designed to recycle waste paper must be related to three main factors: estimates of reliable and economical supply; market demand; and the availability of mill sites with the requisite characteristics. The more concentrated the waste paper supply, and the nearer the recycling facilities are to markets for products that can be made from recycled fiber, the better the chances of success for such new plants.

Looking to the Future

Potentially, waste paper is certainly a source from which further substantial additions to the nation's wood fiber supply may be forthcoming, but some of the projections made for the future reuse of waste paper will require further critical review. For example, in a report prepared for the Department of Health, Education, and Welfare, the National Academy of Sciences has recommended that by 1985 the nation reuse, in effect, 35 per cent of the paper annually consumed, as against the present 20 per cent.²⁵ Since it is estimated that by 1985 paper consumption will have more than doubled, this proposed goal implies an expansion of enormous proportions in the industry's recycling facilities. Achievement of a goal of this magnitude would almost certainly require new recycling technology, new systems of collection, new marketing programs for new products, greater mar- //

ket acceptance of present products, and generally the solution of far-reaching economic, engineering and environmental problems, many of which have not so far been adequately elucidated.

The view is held in some legislative quarters that solid-waste pollution can be controlled by new forms of taxation. Legislation has been advocated which proposes to raise funds through a disposal charge at the manufacturing source to cover the cost of disposing of waste paper, or by imposing a special tax on all packaging. The industry strongly questions the equity and usefulness of these and similar proposals, which give insufficient weight to the complexities of distribution and consumption patterns in the American economy. If adopted, such legislation would not only require price increases with potentially serious adverse effects on markets, but would create costly administrative problems for the government.

The industry is also deeply concerned — and believes that the public, if correctly informed, would share its concern — over legislation or proposed legislation in some states and municipalities that would ban a specific paper product in favor of its plastic "see-through" competitor. Efforts to prohibit the molded pulp tray long used in packaging meat and produce have been highly aggressive, regardless of the tray's long record of proven acceptance by consumers, and its demonstrated values in food protection and convenience. Aside from the questionable premises on which such legislative proposals have been based, they lose sight of environmental considerations — notably the fact that paper trays utilize recycled pulp and are biodegradable. Even more important, laws of this nature directly violate freedom of the market place, which is the ultimate protection of the consumer. The paper industry takes the stand that to rule out any type of packaging and create a monopoly for another type on grounds other than the health and safety of the public is to set a precedent dangerous to the free-market concept of the American economy.

At a time of rapidly changing attitudes and technology in the field of environmental protection, when no one can predict the developments that lie ahead, there is reason to believe that a considerable degree of flexibility in government policy on waste paper will prove essential in working out effective solutions. The entire waste paper situation continues to be under careful analytical study by the industry, which will share its findings with the responsible government agencies.

V.

FORCES FOR PROGRESS

Every paper manufacturer recognizes that effective control of pollution and protection of the environment are essential elements in its planning for the future. A large part of the industry's scientific and engineering research is now concentrated on the abatement of pollution and the enhancement of woodlands. The annual reports of the major paper companies for 1969 give prominence to environmental activities and make unprecedented financial commitments to specific environmental goals. Many smaller companies have similarly multiplied their budgets for anti-pollution measures.

It is sometimes incorrectly assumed that the industry's heightened activity in environmental protection results entirely from governmental and public pressure. While new laws and the national stress on ecology have certainly speeded up installations of anti-pollution equipment, company managements have long regarded environmental planning as an inseparable element in sound business policy. That recognition is demonstrated by the industry's support for the past 27 years of the comprehensive environmental research projects undertaken by the scientists and engineers of the National Council of the Paper Industry for Air and Stream Improvement. The Council maintains regional staffs in key areas of the country and has published hundreds of technical bulletins, valued by ecologists and the government's environmental specialists as well as by the paper industry.

Similar voluntary action for the combined purpose of protecting the environment and the industry's resources has assured progress

in the technology and management of forests. The view of the paper industry on planning for environmental improvement was recently expressed by the head of one major company: "We must do it voluntarily, not because we are altruists, but because we are good businessmen -- because we have the capability to find better solutions."²⁶ Reflecting this conviction, environmental expenditures have become a large, growing and permanent element in corporate budgets throughout the industry.

The industry's progress in environmental improvement is also being assisted by the recently-emerged multi-billion dollar pollution-control industry. At the beginning of 1970, some 3000 American engineering, chemical and equipment companies were competing for business in this field, with the paper industry as one of their larger markets.²⁷ Paper company executives, while themselves actively engaged in many pollution-control programs applicable to industry in general, are being continually informed by specialized companies about new engineering developments that will help them solve pollution problems. They are thus able to check out efficiencies of equipment and costs of operation in far less time than was required for such investigations a few years ago. While this influence for environmental protection cannot be statistically measured, it is undoubtedly significant.

Most paper companies have assigned men to full-time corporate responsibility to help guide environmental programs and now keep all levels of their executive staffs informed about environmental matters. In more than one company, management sends out to its entire organization a frequent newsletter dealing entirely with environmental problems and solutions throughout the nation.²⁸

VI.

SUMMING UP

The commitment of the paper industry to environmental protection is expressed both in massive budgetary allotments already made for pollution control and in executive determination to get the job done. All forms of pollution — water, air and solid waste — are receiving concentrated and priority attention from the industry's managers, scientists and engineers. Recent technological advances have opened up new and hopeful avenues of progress. Better understanding between the industry and government at all levels is being achieved as more data becomes available.

The issue of environmental protection in any locality is usually much more complex than the general public realizes, involving as it does regional ecology, community patterns, limited availability of funding for municipal projects, and the variety of problems of different industries. Even today, most Americans do not clearly understand that some alteration of their physical environment is a natural product of our civilization, one that results from an explosion not only of population but of affluence and technology as well, and is directly linked to rapid urbanization, with half of our national population crowding onto 1 % of the land.²⁹ These conditions unquestionably threaten the sense of well-being of the society. In seeking to reverse the decline in environmental quality, industry, working with government at all levels and with concerned professional and public organizations, has a clear responsibility to act promptly and with all vigor.

No one industry by itself can solve all the local pollution problems with which it is concerned, or exert more than a modest influence on what is being done by the nation as a whole for environmental protection. It is fair to say, however, that the paper industry has set a constructive example. How effective its effort will be depends in large measure on the foresight and wisdom of federal, state and local policy throughout the country, on public awareness and cooperation, and on the condition of the national economy; but that the effort will be strong and sustained there can be no doubt.

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GLOSSARY

ambient air quality criteria — A scientific relationship between particular concentrations and durations of specific air contaminants, and the effects they produce on persons, animals, plants or materials.

amortization — For tax purposes, writing-off against income a portion of the cost of capital assets in each of several years. Rapid amortization is a write-off in a fewer number of years than the capital equipment might be in use, such as 5-year amortization for pollution control equipment that might have a useful life longer than a 5 year period.

biodegradable — The property of a substance that permits it to be broken down by microorganisms into simple, stable compounds such as carbon dioxide and water.

black liquor oxidation — The process which supplies oxygen to kraft black liquor and through chemical oxidation of certain unstable or reduced sulfur compounds prevents them from escaping a recovery furnace system and thereby controls odor from this source.

BOD (biochemical oxygen demand) — BOD is a measure of the amount of oxygen used by microorganisms to consume biodegradable organics in waste water. The BOD test is widely used to measure the organic strength of waste water in terms of dissolved oxygen that would be consumed if the waste water were discharged into a natural body of water.

boxboard — Paperboard used in the manufacturing of cartons and rigid (set-up) boxes.

combination paperboard — Paperboard manufactured from a combination of recycled fibers from various grades of paper stock with the predominant portion being recycled fibers, sometimes including a very minor portion of virgin fibers.

corrugated boxes — A box made of paperboard referred to as containerboard. Two facings of linerboard are combined with a center of fluted paperboard medium. The center fluting gives the box rigidity and strength and, at the same time, light weight.

dewatering — The removal of water from sludge by filtration, centrifugation, pressing, open air drying, or other methods which provide a material suitable for disposal by burning or landfilling.

ecology -- The science of the relationships between organisms and their environment.

effluent (liquid) -- The outflow of sewers or waste conduits from any source, such as homes, industrial plants or sewage treatment plants.

emission (gaseous) -- The stream of waste gases released into the atmosphere as the product of combustion or industrial processes.

even-age stands — Forest areas where the trees are all of the same age due to planting or harvesting the entire area at one time. Even-age stands are desirable for species whose young trees do not thrive in the shade of older trees.

fiber cans — Paperboard which is spiral wound to form the tubular portion of the fiber can, on which metal ends are usually crimped on the top and bottom. Fiber cans are sometimes lined with plastic and frequently laminated outside with plies of paper, foil and plastic.

fly ash -- The finely divided particles of ash entrained in flue gases from the combustion of fuel.

fossil fuels — Coal, petroleum and natural gas.

hemicellulose — Any of a number of cell-wall polysaccharides occurring in nearly all vegetable fibers which are not extractable by water or by most organic solvents.

kraft mill — A mill which manufactures pulp from fibrous cellulose raw material by the sulfate process.

landfill -- A method of disposing of refuse on land by utilizing the principles of engineering to confine the refuse to the smallest practical area and to reduce it to the smallest practical volume.

lignin — The organic substance that holds together the individual fibers of wood. Lignin is responsible for the dark color in pulp mill effluents.

mixed papers — A grade of waste paper of various kinds and quality usually collected from stores, offices, and schools.

molded pulp products — Contoured fiber products molded from pulp for such uses as egg packaging, trays for fresh meat or produce packages, plates, and protective packaging.

newsprint — Paper generally used for printing newspapers.

organic matter — Chemical compounds of carbon combined with other chemical elements, and generally manufactured in the life processes of plants and animals. Most organic compounds are a source of food for bacteria and are usually combustible.

paper -- The name for all kinds of matted or felted sheets of fiber (usually vegetable, but sometimes mineral, animal or synthetic) formed on a fine screen from a water suspension. Paper derives its name from papyrus, a sheet made by pasting together thin sections of an Egyptian reed and used in ancient times as a writing material.

paperboard — A broad category of paper products generally referring to products heavier, thicker, and more rigid than paper. Paperboard includes solid wood pulp paperboard (paperboard manufactured predominantly from virgin wood pulp),

and combination paperboard (paperboard manufactured from a combination of recycled fibers from various grades of paper stock, and sometimes including a very minor portion of virgin fibers).

particulates — Small particles of liquid or solid matter.

precipitation — The physical or chemical separation of a substance from solution and usually associated with induced settling.

pulp — Fiber material that is produced by chemical or mechanical means or a combination of the two from fibrous cellulose raw material and from which, after suitable treatment, paper and paperboard are made.

pulpwood — Wood species suitable for the manufacture of wood pulp.

recovery furnace — The device employed to accomplish combustion of the organic material in evaporated spent pulping liquor. The inorganic chemicals remaining after combustion are recovered and recycled back into the pulping process.

recycling — The collection and treatment of a waste product (such as waste paper) for use as raw material in the manufacture of the same or a similar product.

reforestation — The planting of a harvested forest area with tree seeds or seedlings, either by man or by natural seeding from adjacent trees.

secondary fiber -- Fiber used as a raw material for making new products. The fibers have been reclaimed from waste paper or collected during the manufacture of paper and paperboard products.

sludge -- The concentrated solid material which has been collected in treatment plants. Sludge must be treated and disposed of with minimum pollution of air, land or water.

solid waste — All items discarded after use in a solid state that must be collected and disposed of separately. Solid waste is collected by municipal collection systems. Solid waste does not include items discarded into sewage systems or those emitted with smoke or gas.

sulfur dioxide -- A gas normally produced by the combustion of materials containing sulfur.

wood chips — Small pieces of wood from debarked logs for processing into wood pulp.

wood fiber — Fine, elongated cells of wood about 1/32nd of an inch long. Loose wood fibers suspended in water make up wood pulp, from which most papers are made.

virgin fiber — Fiber which has not previously been used in the papermaking process.

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What the Solid Waste Council of the Paper Industry is Doing

Reporting on the activities of the Council, the chairman said that a two-fold recycling concept, recycling into new products and recycling into energy, is the solution to effective solid waste management.

F. S. Cryslar, executive vice-president, Container Corp., and chairman, Solid Waste Council.

The Solid Waste Council was formed to meet the mutual needs of API, the Fibre Box Assoc., and the Paperboard Packaging Council in responding to the public attitude that paper and board contribute more to municipal solid waste than they should. This public pressure to reduce the percentage of paper and board in municipal solid waste from its present 50 per cent level has precipitated four primary objectives for the Council:

1. To study the solid waste problem and our industry's role in it,
2. To search for and find answers to solid waste management, including waste paper reclamation,
3. To create awareness of the alleviation of solid waste through packaging, and
4. To educate the public and government on the realities of paper and board's relationship to solid waste management.

The Council has established two subcommittees—public relations and technical and research.

Two committees

The public relations group will communicate progress, answers and conclusions developed by the technical committee as well as other appropriate groups. It will attempt to sort out some of the "image" elements which have generated the accusations that paper and board manufacturers are wasting wood and land resources, and it will attempt to educate the general public on the status of our industry's involvement in recycling.

The committee hopes to communicate several facts: That the industry does much to conserve waste wood and other fibers; That the industry is unique in that it replenishes its own raw material; That it reuses 20 per cent of its production; and that food packaging, though requiring disposal, creates almost no problem relative to

the residue from whole foods which would otherwise be brought into the city. These inedible discards are now left at the processing plant and utilized for other productive purposes such as animal feed.

The second committee is technical and research. The API Board of Directors has approved a budget of up to \$50,000 for the remainder of this year and a probable allocation of \$100,000 for 1972 to cover studies on paper reuse, with solid waste and recycling experts. These studies will investigate the potential for waste paper found in solid waste to be utilized for new paper or other products, and the role of paper in solid waste disposal systems. The recycling study will appraise both short term, and long term, recycling goals, including the proposed 35 to 50 percent level of recycling recommended for 1985 by the National Academy of Sciences. The potential for recycling will be studied in several ways: as it relates to various grades of paper and board, availability of suitable wastepaper at competitive costs to meet the needs, comparative manufacturing costs, capital investment required, and the impact upon the environment and the general economy of whatever action is considered and taken.

The committees will cooperate and work with government organizations also concerned and involved in this subject, including the Council on Environmental Quality, The General

Services Administration, the Bureau of Solid Waste Management, industry groups such as the National Center for Solid Waste and other professional groups.

Recent information indicates that, while CEQ and GSA are dedicated to increased withdrawals of wastepaper from solid waste for reuse in new products, they are also desirous of recognizing present levels of reclamation of fiber from lumber wastes, rags, rope, bagasse and other fiber sources otherwise wasted.

In its examination of recycling, the technical committee will review and evaluate the newer recycling and pulping systems, including deinking processes and those where no deinking is required. The latter, of course, referring mostly to paperboard.

The second major study will relate wastepaper to municipal solid waste disposal systems. One point that must be made here is that, after taking out the economically recoverable, non-contaminated secondary fibers contained in solid waste, the balance of solid waste must be substantially reduced in volume or the problem will continue to be a serious one.

Garbage disposal

If paper use doubles, the amount of paper disposed of will grow from 40 million tons to 80 million tons and continue to be 50 per cent of municipal waste, assuming all other factors hold. On the other hand, if recycling

The concept of recycling refuse into energy via incineration may be the eventual solution to the residues and composites of all kinds of solid waste which have no economic values.

From remarks at the Spring Meeting, Paperboard Group, API, The Greenbrier, May 18, 1971.

into paper and board. However, per cent, the tonnage used will not just double to 20 million, but will redouble to 40 million tons. However, the paper and board in solid waste, will still increase to 60 million tons and the per cent of waste paper in municipal solid waste will drop to only 43 per cent from its present 50 per cent level.

Over the years, the traditional method of disposing of solid waste has been to dump it on the ground or in a ravine. Municipalities continued to use this practice since it was cheap in spite of the problems created. However, this is no longer acceptable for a number of reasons: the larger cities have run out of land fill space, open dumps pollute the air, support rodent life and undesirable insects, produce objectionable odors and thus degrade the quality of the environment. While paper is biodegradable, it also catches fire when combustion starts in open dumps, further polluting the atmosphere.

Where land is available, solid waste can be deposited, compacted by bulldozer and covered with soil in a sanitary manner. Paper compacts readily and is biodegradable, but at a very slow rate in the absence of air, moisture, and sunlight. However, as refuse biodegrades in land fill, it causes settling of land, produces gas and can cause leaching of contaminants into ground water. The amount and cost of land consumed in sanitary land fills can be reduced in the extreme if the non-reusable refuse volume is reduced by incineration, using the paper as the fuel in modern equipment with high temperature combustion, and heat extraction for energy conversion.

Incineration important

Incineration reduces municipal waste in two ways—the remaining inert materials weigh only 25 per cent of the original amount, and the volume is reduced to less than 10 per cent. Thus, incinerated refuse requires significantly less amounts of land fill space and makes a firmer base for future land use. Incinerator residue can further be reduced in volume by “mining” minerals and glass to the extent they have economic value in reuse. The paper content serves as a clean fuel in incineration as it is low in nitrogen, sulphur and chlorine content.

The concept of recycling refuse into energy may well be the only eventual solution to the final residues and composites of all kinds, in solid waste, which have no other economic values. And this includes papers contaminated with chemicals, and sanitary wastes.

“These studies will investigate the potential for wastepaper found in solid waste to be utilized for new paper or other products, and the role of paper in solid waste disposal systems,” stated Mr. Cryslar.

A key point for all of us to remember is that even if waste paper reuse were doubled, municipal waste would still contain over 43 per cent waste paper. It is questionable whether or not we will be able to double the percentage of our present reuse within the next fifteen years, no matter what the pressures are.

We must realize that the government looks at the solid waste problem as being of primarily paper, since paper and board account for 50 per cent of municipal waste and have recovery potential. What is often overlooked is the fact that one of the main attributes of paper and board is its very disposability, which has been adapted to human needs and convenience, and renders much of the tonnage unsatisfactory for reuse in new paper. The government officials focus on our industry because they know that we are already recycling at a 20 per cent level. We have proved recycling to be a commercial success. When the paper and board reuse rate is compared with the approximately one per cent for aluminum cans and glass bottles, we come out well ahead.

The response by the public is significant because the public does hold the key to effectively getting more waste paper reused in new products. Before secondary fibers can become even a greater commercial success, there must be widespread acceptance at all levels of consumption. Without consumer demand for recycled fibers, the rate of use will not increase. Following consumer demand, coupled with proper economics, we must promote changes in specification standards so that secondary fiber can be utilized more extensively in our present products, and in new products.

Increased paper and board use

Paperboard manufacture reuses eight million tons, or 30-plus per cent of all board, without deinking, without creating water pollution problems in the process. Thus the percentage of recycled fibers in paperboard could be expanded without creating more pollution. However, the same is not

true for paper conversion. Paper production currently reuses two million tons of waste paper, or eight-to-ten per cent of total production, and most of this requires deinking. To expand this area, equipment that will prevent water pollution is needed in each mill undertaking the use of even the smallest quantities of wastepaper.

It would seem that any increase in recycling will have to come about selectively. It would be wasteful, uneconomical and impractical to make all mills install deinking and/or cleaning systems and transport waste paper to the generally remote pulpmill locations. The important point is how recycling can be increased, not how evenly it is distributed between mills.

Additionally, municipalities need to be shown that they should make secondary fibers available at the lowest possible cost at the earliest point in the collection system, before contamination. Cities must realize that this is a proper and desirable alternative to having to pay the cost of disposal. If waste paper is to be effectively reused, it must come out at the right economic point before it enters the solid waste stream.

Summary

In summary, the Solid Waste Council must be concerned with whatever approaches, in relation to secondary fibers, will lessen the solid waste management problem.

The Council is concerned with finding courses of action and answers. We are convinced that a two-fold recycling concept—recycling into new products and recycling as fuel in waste incineration—is the solution to solid waste management. We do not believe that public interest in the environment has reached its peak, and we are convinced that progress will be made toward the social good.

Our industry may be able to determine the right response. In all likelihood, this may not agree with all ideas thrust toward us. How well we are able to convince our public of the right answers will determine in the end what goals we satisfy.



RECREATION RECYCLED

VOL. 1, NO. 2

Published by the D. C. Department of Recreation

JUNE, 1971

OUR DIRECTOR LOOKS AT ECOLOGY

In April we proudly introduced Volume 1, No. 1, of the Department's Ecology paper which we chose to call RECREATION RECYCLER. This is your paper. We hope that you find it interesting, helpful, and instructive. It is published to stimulate your thinking and to motivate your actions in the very important field of Ecology.

You will note that this issue has been printed on recycled paper. We believe this may be something of a first for the District. If it is a first we are happy that it fell to the Department of Recreation to lead the way. This action was suggested by one of our highly motivated field employees.

For sometime yet our paper needs will have to be met from pre-cycled stocks which we are required to purchase from G.S.A. However, in the case of RECREATION RECYCLER we feel that we must be honest and practice what we preach. To do so we looked elsewhere for several reams of recycled paper and were presented with a gift for the occasion. We have taken this action to make a point. We agree with you that Government must lead the way if we are ever going to restore our environment. Unless there is a demand for recycled paper there will be no economic motivation for industry to act, and our solid wastes will remain a drag on the market.

We hope that we have lighted a little candle which, while small, throws a ray of light where others may tread.

Joseph H. Cole
Director, Department
of Recreation

* * * * *

NOISE IS POLLUTION. And the United States is the noisiest country in the World and getting noisier. If nothing is done about it in ten years our environment will be twice as noisy as it is today.

-----Mass. Audubon Society

WE'RE STARTING NOW

In our first issue of RECREATION RECYCLER we printed a symbol or logo as it is called, and asked, "Do you Recognize this Sign?" If you are still puzzling over it hold this copy of the Recycler up to the light and read the paper's watermark. Recognize the sign? You can also read the words "Ecology 100% Reclaimed Waste." There's your answer. The revolving arrows are the symbol of a product made from recycled material, in this case, paper.

We have been enabled to take this step through the courtesy of Frank Parsons Paper Company, Inc., Washington, D.C. who very kindly gave us three reams of recycled paper just for this printing.

Perhaps you would be interested in the story back of the recycled paper which you hold in your hand, having already learned its name from the watermark. This particular paper was made by the Riverside Paper Corporation of Appleton, Wisconsin, using a patented "Poly-Solv" process. The fiber in this paper comes from defective milk cartons, paper cups, food packages and other waste that is wax and film coated; waste that was previously destined for the incinerators or land-fill sites (primarily manufacturing waste.) By this special "Closed System" process that is environmentally clean they say their paper is made without fouling the air, the water, or the land, while recleaning the needed fiber. The plastics, waxes, etc. (essentially petroleum derivatives) are condensed and blended with high grade fuel oil to provide a heat source for the process.

It is interesting to know that only 24 reams of this paper (letter size) re-uses a tree, thus permitting one to remain standing where it grew. Those same 24 reams of 100% recycled paper means that 130 pounds of coated paper waste will not be sent to the incinerator or a land-fill site.

There are already a number of paper companies who are now producing recycled paper of various grades and as the demand for this type paper grows there will be more.

This is not the whole answer to our pollution problem, but it is a step in the right direction.



Bills have been introduced in both the House of Representatives and in the Senate authorizing and directing the two procuring agencies of the Federal Government, General Services Administration and the Defense Supply Agency, to prescribe regulations with respect to the amount of recycled material contained in paper procured by those agencies.

Congressman John G. Dow (N.Y.) and 40 cosponsors have introduced H.R. 8005 and H.R. 8007. At the same time Senator Howard W. Cannon (Nev.) along with Senators Fannin and Bayh have introduced S. 1839 and S. 1840 in the Senate bills, similar in intent to the House bills.

In introducing his bills Congressman Dow stated that the Federal Government is the largest single paper purchaser in the country buying more than 400,000 tons a year. He said the Federal Government has the responsibility to lead in the efforts to use recycled material to the greatest extent possible. RECREATION RECYCLER salutes Congressman John G. Dow and all members of House and Senate who are promoting these efforts at solving our solid waste problem.

EARTH WEEK - ON THE RECORD

Senator Gaylord Nelson (D. Wisc.) is collecting all the information available on Earth Week - 1971 such as news clippings, programs of events, pins, buttons, bumper stickers, etc.

We are proud to say that the Department had seven items to contribute to the Senator's collection. All seven items reflect the vigor with which we are tackling the problems of the environment.

**half-fast
athletes
smoke**

ENVIRONMENTAL QUALITY - THE NEW BEACON

Dr. Oswald, President of The Pennsylvania State University told the March graduates "the exciting thing about this generation is that, for the most part, you are choosing, in great numbers, to deal with the survival crisis of our time." He said students today are questioning progress, and asking what is really advancement in the quality of life.

"For some older people, these questions shake the very foundations of life's focus," he said. "A generation ago there was seemingly little doubt that more was better and yet all of us stand to benefit from at least pausing to look around us and see in what directions various choices lead."

"We travel together, passengers on a little space ship, dependent on its vulnerable reserves of air and soil; all committed for our safety to its security and peace; preserved from annihilation only by the care, the work, and I will say, the love we give our fragile craft."

Adlai Stevenson

Pollution begins with people. And people can stop pollution only when recognition of our dependence on nature becomes second nature to us all."

Henry Gibson

Girls, do you think there is nothing to this air pollution? A nylon stocking placed on a leg form and set out on a fire escape in the business district in a large city disintegrated in two days from air pollution according to Columnist Dorsey Connors.

FADING ROMANCE

America's love affair with the automobile may be starting to go on the rocks in urban areas. City dwellers are beginning to become aware that the private car is exacting too high a price in air and noise pollution and congestion to be an efficient form of transportation in heavily populated urban areas. The cost of insurance is beginning to make the private car exact too high a price in operation.

-----Engineering News Record April 15, 1971

LET'S RECYCLE
THEM



OFF OUR STREETS

EARTH WEEK

POPOLLUTION

EARTH WEEK was observed by the Division of Neighborhood Centers April 19 through the 23rd.

There was so much going on all over the city that it required a ten page program to list all the activities. We haven't space enough to cover them all. Suffice it to say that there were discussions, films, cleanups, plantings, bicycling, Eco-contests, displays, art, trash-craft all showing considerable imagination.

RECOGNITION COMING OUR WAY

A very nice two page article about the Department's Washington Youth Gardens with color photos by our own Bill Hash appeared in the May 1971 issue of World Traveler. Good work all you Gardeners!

* * * * *

EARTH WEEK FROM AREA 8

E cology - the name of the problem
A nswers - we're looking for them
R ecognize - that's the initial step
T ime - it will run out soon
H elp - that's your part of the solution
W ork - it will take plenty of that
E veryone - we need you to help
E ncourage everyone to
K eep working to clean up pollution

* * * * *

AFTER EARTH WEEK

In our first issue of RECREATION RECYCLER we stated that Earth Week was our challenge. We are happy to report that we in Recreation did ourselves proud that week.

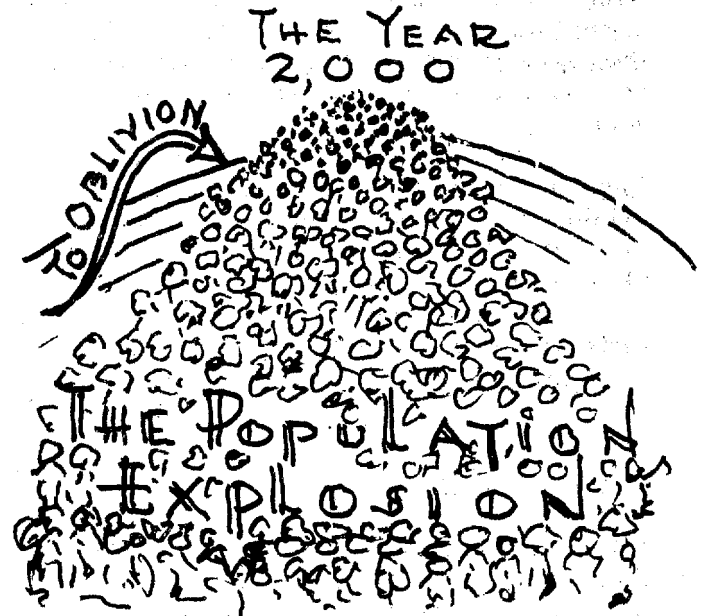
As we publish our second issue we must ask what are we doing now? Have some of us turned our attention to other matters? If we have, we must ask ourselves, what in the world can be more important?

The environment in the 1970's is not a sometime thing which we can think about when we feel like it. The world is in the sad state that it is because we have, in the past, given our environment only grudging attention. We can't do that anymore.

Our very lives depend upon whether we remain part of the problem or do our level best to become a part of the answer. We are now in a fight to the finish. Let's make it a fight worthy of the long glorious history of mankind.

At the time of Christ the population of the entire world was only about 250,000,000 persons, little more than the present population of the United States alone.

By the year 2000 (today's 11 year old by then will be 40) he will have no place to stand, for at the rate babies are being born today the world population will be 6,300,000,000 and accelerating every second.



THE POLLUTION EQUATION

Population Size X Per Capita Consumption X Environmental Impact per unit of production = Level of Pollution

The above equation shows that Modern technology extends man's effects on the environment far beyond his biological requirements for Air, Food and Water.

Pollution in the U.S. during 1946 - 1968 increased over a range from 200 to 1,000 per cent.

-----From the April issue of "Environment"

POLLUTION MEETING

They talked of Air Pollution
And knew where of they spoke,
Discussion was informal
It was alright to smoke

They dwelt on smoke from Industry,
Car smoke called forth regrets;
As uncomplainingly, They breathed
Blue trails from cigarettes!!!

Mary Louise Cheatham

BOOKS YOU MIGHT LIKE TO READ

The Washington Ecology Center, whose address is 2000 P St., N.W., Room 308, Washington, D.C. 20036, has produced a delightful little handbook entitled "Washington Ecotactics Guide," 46 pages, price \$5.50.

For the interested Environmentalist it would be difficult to get a better bargain for his half dollar, anywhere.

This is an action booklet covering the following chapter headings: Air pollution, Water pollution, Transportation, Housing, Land Use & Urban Planning, Parks and Open Space, Solid Waste, Power, Noise, Pesticides, Population, Consumer Practices, Packaging and Environmental Education.

Each of the above chapters sets forth the problem, Targets for action, What you can do, Where to complain, and Groups involved in the action.

You have only to read this little book to learn where you fit into the picture.

We strongly recommend that you get one of these booklets as soon as you can.

* * * * *

ECOLOGY FILMS

B F A Educational Media, a division of Columbia Broadcasting System Inc. offers the following New 16 MM Ecology Films for Rent. For information on how to procure the films get in touch with Mr. Lawrence Lemmon.

Jr. - Sr. Hi/College/Adult

Man's effect on The Environment - 13½ min.
color only Rental Rate \$10.00

Junior - Senior High

Peace and Voices in The Wilderness 9½ min.
color only Rental Rate \$6.50

Elementary/Junior - Senior High

Noise - 10 min. color only
Rental Rate \$8.00

* * * * *

ORGANIZATIONS WORKING IN THE FIELD OF ECOLOGY

Izaak Walton League of America

1800 Kent St.

Rosslyn, Virginia 22209 (528-1818)

National Center for Solid Waste Disposal

1625 I St., N.W.

Washington, D.C. 20006 (296-2664)

Concern, Inc.

2100 M St., N.W.

Washington, D.C. (466-2066)

A DROP OF WATER

A drop of water has a history as old as the world. It has been a part of every action since our world was formed.

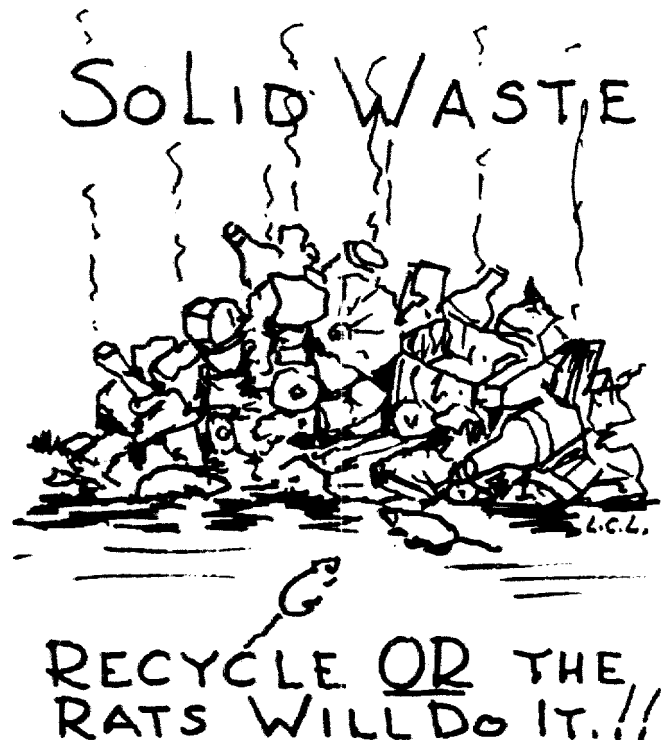
One day it is the dew hanging from a blade of grass, or it may spend some time as ice in a glacier or a snow flake.

It has been in the body of the dinosaur many times over as it is in our own body and blood today.

It represents 74% of what we call "me"

We use it and we abuse it. We drink it and we pollute it. Worst of all we take this most wonderful gift of God for granted.

Let us all save this ancient heritage without which we could not sustain life more than a few days.



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FRANK PARSONS PAPER COMPANY, INC.



3600 NEW YORK AVENUE, N. E. WASHINGTON, D. C. 20002

 (202) 832-1000

Recycled fiber - - reclaimed waste....

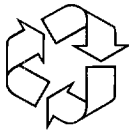
What do these mean?

Riverside Paper Corporation has come up with one answer and it is a good one. This letter is printed on White Ecology Bond, substance 20, and is watermarked "Ecology - 100% Reclaimed Waste." It is just that, having been made from waste milk cartons, paper cups and other plastic and wax coated "disposables," collected from manufacturers. Treated by Riverside's "Poly-Solv" patented process, these waste products have been made into "Ecology Bond" instead of being incinerated or used as land fill.

Ecology Bond is made in White, Blue, Tan and Green and is now in stock in our warehouse. It is available in substance 20 in four sizes, 8½ x 11, 8½ x 14, 17 x 22 and 22 x 34. Sample packets are available for your inspection and trial. We are sure you will be as amazed as we were with the quality and printability of Ecology Bond - 100% reclaimed waste, as proudly stated in its watermark.

Call 832-1000 for Ecology Bond and other fine papers.

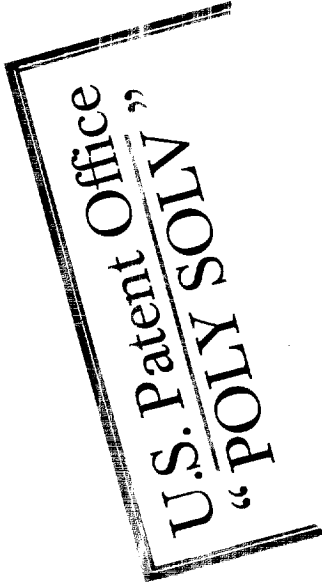
FRANK PARSONS PAPER COMPANY, INC.



A RECYCLING INNOVATION

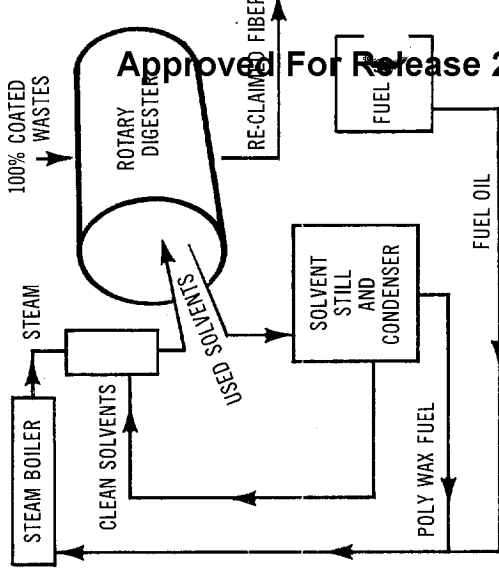
The fiber in Ecology Papers is 100% reclaimed waste — not 20-40 or 80%, but actually 100% reclaimed waste.

It comes from milk cartons - paper cups - food packages - and other waste that is WAX AND FILM COATED —

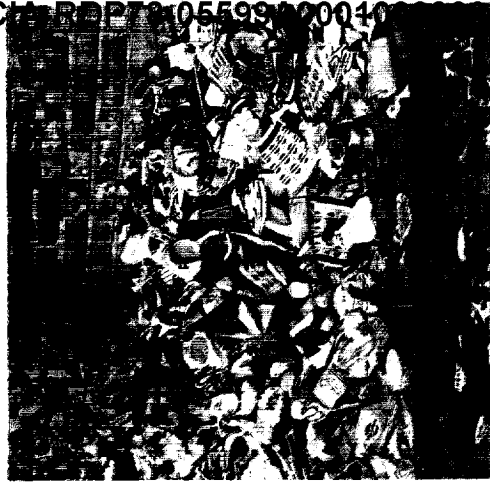


- Riverside's patented "Poly-Solv" process now makes it economically feasible to recover fiber from such coated waste.
- Plastics, wax, inks and adhesives are dissolved and the fiber salvaged and sanitized for reconversion into excellent quality paper.
- The process itself is environmentally clean. A "closed system", it fouls no air, pollutes no water and, the non-fiber residue is converted into a clean fuel supplement.

THE POLY-SOLV PROCESS



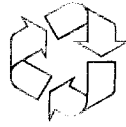
THE WASTE



Bales of wax and plastic coated waste are prepared for processing in the reactor. It is primarily manufacturing waste.



**A NEW - practical way
to contribute to a
BETTER ENVIRONMENT**



ECOLOGY

PAPERS 100% RECLAIMED WASTE

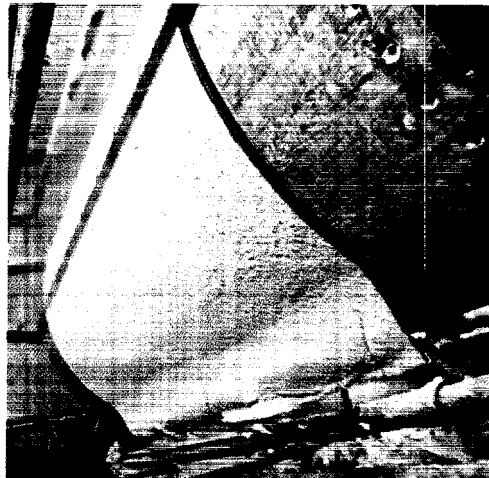
Distributed By
FRANK PARSONS PAPER COMPANY, INC.
Washington, D. C.
AREA CODE 202 832-1000

THE REACTOR



The prepared waste is "dry-cleaned" with super-heated solvents under closely controlled pressures. Three re-cycles per batch are required to strip the plastics, waxes and other contaminants from the fibers.

THE RECLAIMED FIBER



The dry-cleaned and sanitized fibers are discharged from the reactor into our conventional papermaking system.

SOLVENT RE-GENERATION



The solvent from each of the three re-cycles is separated from the contaminants and re-generated to process the next batch of waste.

RESIDUE SALVAGE

The plastics, waxes, etc. (essentially petroleum derivatives) are condensed and blended with high grade fuel oil to provide a heat source for the process.

WHAT'S YOUR CONCERN FOR THE ENVIRONMENT?



Poly-Solv is a closed system which fouls no air.



Poly-Solv uses water only for cooling — and re-cycles it within the system.



TREES

Only 24 reams of ECOLOGY PAPER re-uses a tree. (letter size).



SOLID WASTE DISPOSAL

Those same 24 reams of ECOLOGY PAPER reclaim 130 pounds of coated paper waste from incineration and land-fill sites.

*Contribute to a better
environment by insisting on
ECOLOGY Papers — 100%
Reclaimed Waste*

***WATERMARKED so people
will know you care***

This message is printed on ECOLOGY BOND Sub. 20 (available in white, blue, tan, green and grey).

Riverside Paper Corp., Appleton, Wis. 54911

COLORS

100% RECYCLED FIBER

COLORS

This unique medium has many practical and economical values for the aggressive graphic designer and craftsman. It dramatizes color combinations never exposed before — and uses these combinations to attract, motivate and create new dimensional stability, excellent opacity, and accepts all types of printing.

100% RECYCLED FIBER

COLORS II

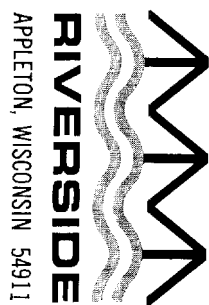
BASIS 25 x 38 — 70*

9 SHEETS 16 COLORS	STANDARD STOCK SIZES	WT. M	SHT. CTN.
II TONE GOLDS			
II TONE BLUES	1 x 22	500M	2100
II TONE SALMONS	21 x 35	1190M	1200
II TONE GREENS	25 x 38	1400M	1000
II TONE REDS	35 x 45	2320M	600
II TONE BROWNS			
II TONE BLACKS			
II TONE PURPLES			

Stocked in New York for immediate shipment.

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Riverside Paper Corporation,
the Color Experts.



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